



## GNSS + INS Post-Processing Software

### Benefits

Easy integration with NovAtel's SPAN® GNSS + INS products

Powerful IMU processor built on top of familiar GrafNav® interface

Streamlined new Project Wizard for quick startup

### Features

Loosely and tightly coupled GNSS + INS processing

Tightly coupled Precise Point Positioning (PPP)

NovAtel's AdVance® RTK for fast and reliable ambiguity resolution

Support for multiple base stations

Built-in processing profiles for airborne, ground and marine projects

Boresight module for solving angular offsets between IMU and camera frames

### Post-Processing for Improved GNSS + INS Accuracy

For applications that require high levels of accuracy and do not require the results in real-time, post-processing is a natural solution. Post-processing leverages the ability to combine forward and reverse processing results, thereby maximizing the accuracy of the trajectory and providing an indication of both solution reliability and accuracy. Advanced processing techniques, such as backwards smoothing, can be applied in post-processing which removes up to 95% of position error over complete GNSS signal outages as compared to a real time solution.

In order to achieve high levels of GNSS + INS accuracy in real time, a data link must be maintained in order to receive corrections such as RTK or L-Band. This adds complexity to the field procedures and may require a subscription. Further, maintenance of a data link is sometimes not possible due to signal obstructions.

### Inertial Explorer: Easy to use, Feature Rich

Easily create your first project using Inertial Explorer's New Project Wizard. Automated processing environment detection (Aerial, Ground Vehicle, and Marine) allows appropriate GNSS + INS processing settings to be automatically loaded prior to your first processing run. This simplifies workflow and reduces the learning curve needed to start producing quality results.

Features such as automated alignment, robust automatic ZUPT detection and the application of phase and range updates helps ensure the best possible accuracies are achieved, even in conditions challenging to GNSS signal reception.

Inertial Explorer provides maximum flexibility to suit your application and preferences, including support for both tightly and loosely coupled processing, multiple base station support for large project areas and tightly coupled Precise Point Positioning (PPP) for applications that do not require a base station.

Inertial Explorer provides access to over 50 quality control plots in order to help gauge the level of accuracy of your survey and provide confidence in the solution. If problem areas are identified, Inertial Explorer provides access to powerful reprocessing options and the best customer support in the industry to help ensure your success.

### A Range of Inputs and Outputs

Inertial Explorer easily imports data from NovAtel's SPAN GNSS + INS products. It can also import GNSS data from multiple receiver manufacturers and has a generic IMU data import tool.

A variety of export formats are provided in addition to a configurable ASCII export wizard.

If you require more information about our software, visit [novatel.com/products/waypoint-software](http://novatel.com/products/waypoint-software)



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## Inertial Explorer Interface

- GNSS and IMU processing under one common interface
- Simultaneous forward and reverse processing for both GNSS and IMU data
- Numerous GNSS and IMU specific quality control plots
- Flexible export tool permits reproduction of most ASCII formats
- Outputs specialized variables such as IMU angular rates and body frame velocities and accelerations
- Position can be translated from the IMU to another sensor location
- Outputs w-p-k angles for photogrammetric applications
- Solves for camera-IMU orientation difference given w-p-k angles from an external source<sup>1</sup>
- Saves processing history

## GNSS Processing

- See the GrafNav product sheet

## IMU Processing

- GNSS only and tightly coupled Precise Point Positioning (PPP) Module
- Loosely and tightly coupled processing
- Automated alignment
- Automatic ZUPT detection to help maximize performance in challenging environments
- Includes RTS back-smoother which removes up to 95% of position error over GNSS outages as compared with a real-time solution
- Multi-pass processing to maximize attitude accuracy in low dynamic surveys
- Extensive control over GNSS and IMU processing options
- Heading updates decoded automatically from NovAtel's ALIGN® system help maximize accuracy in low dynamic applications
- Support for DMI data to further maximize performance in challenging environments

- Supports solving IMU to GNSS lever arm as additional Kalman filter states
- Preloaded with error models for most popular IMU types
- Users can create their own IMU error models
- Supports IMU only processing provided regular external coordinate updates

## Additional Features

### Utilities

- Simultaneous GNSS, IMU and DMI raw data conversion if using SPAN
- Download utility provides access to thousands of publicly available base stations

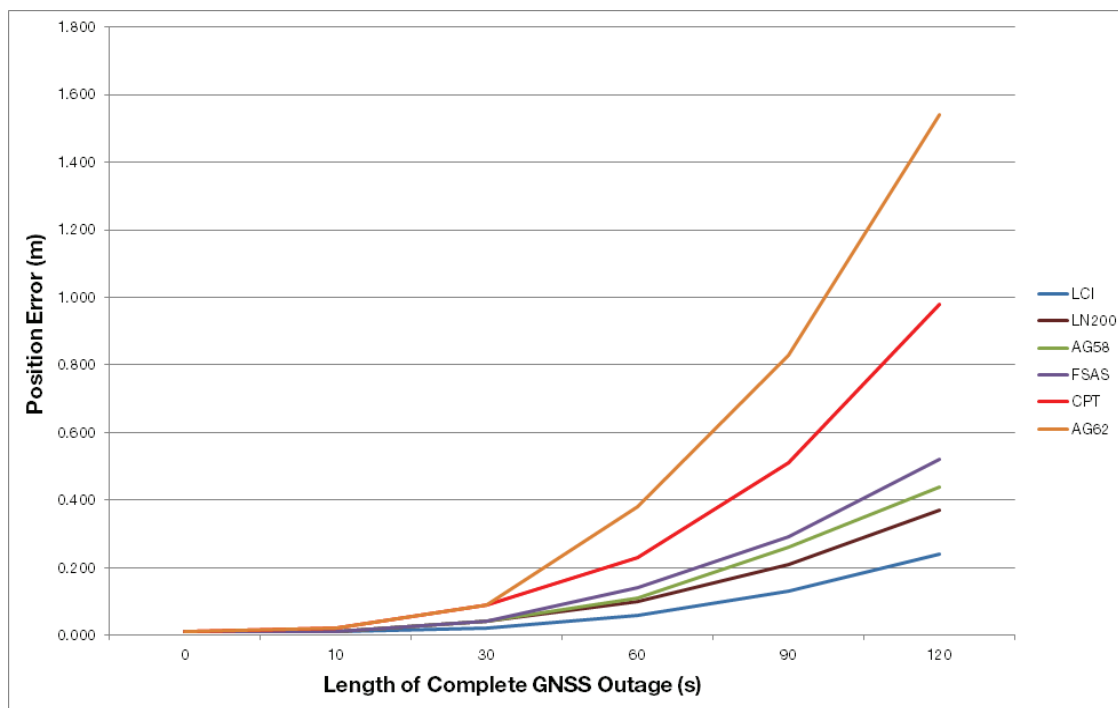
## Upgrade/Support

Any versions released within one year from purchase are available at no charge. Technical support by phone and e-mail is also free for one year after date of purchase.

### Steady State Post Processed Performance<sup>5</sup>

IMU	Position Error <sup>4</sup> (m)		Velocity Error (m/s)	Attitude Error (degrees)		
	2D	Vertical	3D	Roll	Pitch	Heading
LCI	0.01	0.02	0.02	0.005	0.005	0.008
LN200	0.01	0.02	0.02	0.005	0.005	0.008
AG58	0.01	0.02	0.02	0.007	0.007	0.010
FSAS	0.01	0.02	0.02	0.008	0.008	0.012
CPT	0.01	0.02	0.02	0.015	0.015	0.030
AG62	0.01	0.02	0.02	0.015	0.015	0.030

### 3D Position Accuracy Performance During Complete Outages<sup>2</sup>



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<sup>1</sup> Requires separate photogrammetric adjustment package to determine camera exterior orientation angles.

<sup>2</sup> Outage statistics were calculated by taking the RMS of the maximum errors over a minimum of 75 outage periods. Each outage was followed by 120 seconds of full GNSS availability before the next outage was applied. High accuracy GNSS updates (fixed ambiguities) were available immediately before and after each complete outage. A baseline length of 5 km or less was used to generate the outage statistics.

<sup>3</sup> 1 ppm should be added to all values to account for additional error due to baseline length.

<sup>4</sup> LN200 attitude accuracy derived with comparisons to aerotriangulation - please see our paper "Aerial Photogrammetry Test Flight Results" for additional information: <http://www.novatel.com/Documents/Papers/D11716.pdf>

<sup>5</sup> For full velocity and attitude outage performance information, consult the NovAtel IMU data sheets.